CLAIMS

What is claimed is:

1.   A method for distinguishing Cheyne-Stokes Respiration (CSR) within a patient caused by central sleep apnea (CSA) from CSR caused by congestive heart failure (CHF) using an implanted medical device, the method comprising:

detecting a periodicity associated with CSR for the patient; and

determining whether the CSR of the patient is caused by CSA or by CHF based on the periodicity.

2.   The method of claim 1 wherein detecting the periodicity is performed to detect a time period representative of periodic breathing during CSR.

3.   The method of claim 2 wherein detecting a time period associated with CSR for the patient comprises:

detecting sleep;

detecting an episode of CSR during sleep; and

determining the average duration of periods of sleep apnea during CSR, determining the average duration of periods of   ·
breathing between the periods of sleep apnea during CSR, combining the average duration of periods of sleep apnea with the average duration of periods of breathing.

4.   The method of claim 3 wherein determining the average duration of periods of sleep apnea during CSR and determining the average duration of periods of breathing between the periods of sleep apnea during CSR are performed using on one or more of thoracic impedance, AV delay; R-R oscillations.

5. The method of claim 1 wherein determining whether the CSR of the patient is caused by CSA or by CHF based on the periodicity comprises:

      comparing a time period associated with CSR against a predetermined discrimination threshold; and

      if the time period exceeds the discrimination threshold, generating a signal indicating that the CSR is induced by CHF, otherwise generating a signal indicating that the CSR is induced by CSA.

6. The method of claim 5 and further comprising calculating the discrimination threshold by:

      sensing signals representative of thoracic impedance;

      low pass filtering the impedance signals;

      calculating a derivative of the filtered impedance signal;

      identify zero-crossing points within the derivative of the filtered impedance signal;

      integrating the derivative of the filtered impedance signal between each pair of consecutive zero-crossing points to generate a set of integral values; and

      calculating moving average of integrated values for use as the threshold.

7. The method of claim 5 and further comprising setting the discrimination threshold to an initial value between 30 and 40 seconds.

8. The method of claim 3 further comprising detecting arousal of the patient from sleep and rejecting any determination of the periodicity associated with CSR if arousal from sleep occurred during the episode of CSR.

9.   The method of claim 8 wherein detecting arousal of the patient from sleep is performed based on accelerometer signals.

10.   The method of claim 1 further comprising recording diagnostic data relevant to the determining of whether the CSR of the patient is caused by CSA or by CHF.

11.   The method of claim 1 further comprising determining whether the patient is asleep.

12.   The method of claim 11 wherein determining whether the patient is asleep is performed by based on patient activity levels or blood carbon dioxide levels.

13.   The method of claim 1 further comprising delivering therapy to the patient.

14.   The method of claim 1 further comprising delivering electrical nerve stimulation to at least one phrenic nerve of the patient.

15.   The method of claim 1 further comprising delivering cardiac resynchronization therapy to the heart of the patient.

16.   The method of claim 1 further comprising evaluating the severity of CHF if the CSR of the patient is caused by CHF.

17.   The method of claim 1 further comprising delivering therapy to the patient based on the severity CHF.

18.   A system for distinguishing Cheyne-Stokes Respiration (CSR) within a patient caused by central sleep apnea (CSA) from CSR caused by congestive heart failure (CHF) using an implanted medical device, comprising:

a CSR periodicity determination unit operative to determine a
periodicity associated with CSR for the patient; and

a CSR discrimination unit operative to determine whether the CSR
of the patient is caused by CSA or by CHF based on the
periodicity associated with CSR for the patient.

19.   The implantable cardiac stimulation system of claim 18
and further comprising:

a CSA/CHF therapy controller operative to control delivery of
therapy to the patient based on the determination of whether
the CSR of the patient is caused by CSA or by CHF.

20.   A system for distinguishing Cheyne-Stokes Respiration
(CSR) within a patient caused by central sleep apnea (CSA) from CSR
caused by congestive heart failure (CHF) using an implanted medical
device, comprising:

means for detecting the onset of CSR;

means for detecting a periodicity associated with CSR for the
patient; and

means for determining whether the CSR of the patient is caused by
CSA or by CHF based on the periodicity.